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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/680,388	10/07/2003	Fabrice Chopard	046190/269873	5865
826	7590	03/18/2008	EXAMINER	
ALSTON & BIRD LLP			BHAT, NINA NMN	
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101 SOUTH TRYON STREET, SUITE 4000			ART UNIT	PAPER NUMBER
CHARLOTTE, NC 28280-4000			1797	
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			03/18/2008	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/680,388	CHOPARD ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	N. Bhat	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 19 December 2007.  
 2a) This action is **FINAL**.                  2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 2-25 and 28 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 2-25 and 28 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 07 October 2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____.   | 6) <input type="checkbox"/> Other: _____ .                        |

## DETAILED ACTION

1. Applicant's arguments have been fully and carefully considered. Applicant is thanked for the detailed comments regarding the anticipation rejection over Romatier and the other references which were cited in the last office action. The examiner agrees that Romatier is no longer an anticipatory reference. The examiner acknowledges that claim 1 and 26-27 have been cancelled and new claim 28 has been added as the new independent claim from which all of the other claims depend. Upon updating the search, based on the amendments made to the claim a new reference has been found and accordingly a new ground of rejection follows:

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 2-25 and 28 rejected under 35 U.S.C. 103(a) as being unpatentable over Romatier, US Patent 6,190,624 in combination with Berthou et al., US Patent 6,421,501.

Romatier discloses the invention substantially as claimed as discussed in the previous office action, Romatier teaches a device for the exchange and/or reaction between two fluids, which includes a plate type channel reactor, which includes a first chamber and second chamber, the fires and second chamber being separated by a wall the device. The device of Romatier contains a single group of channel pairs (12). Imperforate plates 919) separate the pairs of heat exchange channels into down flow channels (15) and up flow channels (18). Romatier teach that channels (15 and 18) can serve a number of different functions either as a preheater or as a cooler. The cannels can also contain an oxidation catalyst. [Note Column 5, lines 60-67 and Column 6, lines 13-56. Romatier teach that the plates defining the channels for carrying out the reactions and heat exchange within the chamber may have any configuration that produced narrow channels, from Figure 1, it can be seen that there is a spacer which defines a thickness, and divide walls the arrangement defining a first chamber and second chamber. The device as claimed is “suitable for exchange and/or reaction between fluids”. The channels defining the first and second chamber provide a modular configuration. With respect to applicant’s claims 3-6, which recite the specific spacer arrangement, although not explicitly recited as spacers, the plate reactor includes narrow channels to provide efficient heat exchange across the thin plates. The channel width should be less than  $\frac{1}{2}$  inch; the plates have thickness of 1 to 2 mm and are composed of ferrous or non-ferrous alloys, which are capable of withstanding extreme temperatures. The plates can be formed into curves or other configurations and the plates can be stacked. The plates include corrugations that are inclined to the flow of

reactants and heat exchange fluid. The corrugations maintain a varied channel width defined by the height of the corrugations. [Note Column 7, lines 29-67] The corrugations are functionally equivalent to applicant's disturbing devices as recited in Claims 13-15. Figure 6 and 7 teach an arrangement wherein two independent groups of channel pairs circulate different fluids in isolation from opposite ends of a reactor arrangement. Specifically inlet stream (51) supplies fluid to a manifold having upper inlet chamber (53) and upper outlet chamber (54). Inlet chamber 53 distributes inlet stream 51 to channel pairs 55. Upper outlet stream 56 collects fluid from the first group of channel pairs 55 through upper outlet chambers in the channel openings. A lower input stream 58 is distributed to a second group of channel pairs (59) via manifold as described and shown in Figures 6 and 7. The arrangement as taught and described by Romatier enable two different fluids to be circulate din heat exchange relation in a complete cross-flow relationship.[Note Column 8, lines 58-67 and Column 9, lines 1-31.]

However, Romatier does not teach the spacer configuration and arrangement as claimed by applicant.

Berthou et al. teach a heat exchanger which is capable of heating a fluid. Berthou teach that the heater is defined by two plates (3,4) and a spacer 5. The space is a three dimensional element having a hollow central portion (6) between two end portions (7,8) in which a fluid admission inlet (9) and a fluid collection outlet (10) are formed each communicating with the hollow central portion (6). Berthou teach that the purpose of the heater is heat a fluid flowing inside the central portion of the chamber by joule heating the side faces (11) of the spacer are open so that the fluid can make

contact with the plates. In Figure 3, Berthou teach that the spacer include a plurality of apertures, and admission inlet (9), collection outlet (10). The portions of the admission inlet 9 and collection (10) into the hollow portion of the chamber 6 are constructed and arranged for form "divergent" elements thereby enabling the distribution of fluid inside the chamber to be improved and enabling its collection. In Figure 8, there is a heat exchange (17) constituted by a stack of plates (24) pairs of which define chamber (25) in which the two types of fluid flow can be heated. The plates are corrugated (24) and the fluid which is heated is accomplished as it flows inside the first circuit (21) from inlet (19) toward the outlet (43) feeding the second portion (18) loses heat to the fluid that is to be heated which flows through the second circuit(23) from inlet (22) towards the heater.

It would have been obvious from the combined teachings of Romatier and Berthou to provide a device which is capable of heat exchange or reaction between two fluids comprising tightly stacked modular blocks which include first and second flow and the chambers being separated by a spacer. In both Romatier and Berthou the modular stack block construction has been taught for heat exchange. Using the device as a reactor or reaction with heat exchange has been specifically taught in Romatier. The spacer construction and arrangement included the recessed center has not been taught by Romatier but the spacer construction and arrangement has been taught in Berthou. To include the spacer arrangement in the plate reactor/exchanger would have been obvious to one having ordinary skill in the art at the time invention was made because the concept of using a space in order to provide an exchange system between at least

two fluids wherein the first chamber is defined by the side walls of a first space recessed so as to enable fluid flow and the spacer separating the first and second chamber by a first exchanging wall which enables the exchange and/or thermal reaction between the fluid flowing the first and second adjacent spacer. The concept of the spacer as constructed and arranged in a heater has been taught in Berthou to use this spacer arrangement in the plate type device of Romatier would have been obvious if the heat of reaction of the fluids from one chamber is used to heat/or cool the fluid in the second chamber. With respect to applicants claims wherein the includes a one inserted element selected from the group of consisting of a processing material, a vortex generator a fluid guide and stirrer, this has been taught in Berthou wherein at least a "L" shaped fluid inlet or feed inlet has been provided and to add the elements into the spacer would have been obvious to one familiar with plate type/channel type reactors/exchangers in order to improve flow properties and heat exchange properties in the exchange device and is routine to the one familiar in exchange device design.

The reactor of Romatier includes spacers and to position the spacer such as taught in Berthou for the same purposes taught in Berthou in heat exchange of two fluids renders applicant's invention as a whole obvious to one having ordinary skill in the art.

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fenton et al. teach a counter flow thermoelectric heat pump with discrete sections. Pezzuto et al. teach a microfluidic exchange device. Karp et al. teach a fluid mixer in a microfluid system which includes channels defined in different sheets of material.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Bhat whose telephone number is 571-272-1397. The examiner can normally be reached on Monday-Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. Bhat/  
Primary Examiner, Art Unit 1797